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ON THE PRESENCE OF PROBLEMATIC FOSSIL MEDUSÆ IN THE NIAGARA LIMESTONE OF NORTHERN ILLINOIS.[1]

FOR more than a year past my attention has been directed to some peculiar fossils from the dolomitic Niagara limestone of northern Illinois, in the collections of Walker Museum at the University of Chicago and of the Chicago Academy of Science. The exact horizon and location from which the specimens were obtained have in no case been recorded, but the general locality for them all is Joliet, Ill. Additional specimens have recently been secured from the excavations of the Chicago drainage canal, by Mr. L. H. Hyde, of Joliet, and these have been kindly loaned for study.

The complete specimens of this peculiar fossil are disk-like impressions, subcircular in general outline, with the periphery lobed, and with the surface radiately corrugated or smooth. In the center of the disk is a funnel-shaped depression and from the center of this depression a stemlike process rises to about the general level of the surface of the disk. The disk is divided by four ridges, radiating at right angles from the center, into four quadrants. The entire disk is rarely preserved intact, the larger number of specimens being the separate triangular quadrants. Several species are represented in the collection which differ in the lobing of the periphery and in the ornamentation of the disk. As in the case of most of the fossils in this formation, the actual substance has been dissolved out leaving a mold in the rock, and the specimens which have been collected are generally but one side of a thin disklike cavity. None of the specimens have been actually observed *in situ*, but it is believed that the specimens usually collected, viz., those with the central depression and elevation, are the lower sides of such cavities. The upper sides are not so striking in appearance, and have usually not been preserved by collectors. A few have been observed, however, and they differ from the lower sides in being nearly plane over the central part, the funnel-shaped central depression with the central stemlike process being absent. Figure *A* represents diagramatically a cross-section of the fossil, cutting the disk diametrically.

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[1] Just as this paper is going to press additional material from the collection of Mr. E. E. Teller, of Milwaukee, Wis., has come to the writer, which throws a very different light upon the nature of *Cryptodiscus*. One of the specimens in this collection shows a complete disk of *Cryptodiscus* situated at the summit of a tube composed of plates which are arranged essentially as the plates in the anal tube of *Callicrinus*. The evidence of these specimens seems to establish the fact that *Cryptodiscus* is a remarkable disk-like expansion of the four plates forming the terminal ring of the anal tube of some crinoid, probably *Callicrinus*. Additional evidence for the correlation of *Cryptodiscus* with *Callicrinus* is found in the fact that the genus *Callicrinus* occurs at every locality where Cryptodiscus has been observed. The specimens in Mr. Teller's collection will be illustrated and more fully described at another time.

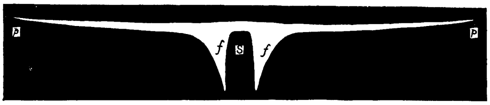

FIG. A. *pp* points upon the periphery of the disk. *f* the funnel-shaped depression in the center of the lower side. *s* the stemlike elevation in the center of the funnel-shaped depression.

In examining the literature, two references have been found to fossils similar to those under consideration. The first of these is in the Twentieth Report of the Regents of the New York State Cabinet of Natural History, where Dr. James Hall, on Plate XI, Fig. 18, gives an illustration of a similar fossil, also from the Niagara limestone. No description of the specimen is published further than the note in the explanations of the plate, which is as follows: "The calyx of a Crinoidean? of a new and peculiar type, for which I suggest the name Cryptodiscus." No locality for the specimen is given, but the species in the accompanying paper are all from southeastern Wisconsin or northern Illinois.

At a more recent date, in the Eighteenth Report on the Geology and Natural History of Indiana, Mr. S. A. Miller has illustrated a single quadrant of a similar fossil from the Niagara limestone at St. Paul, Ind. A short description is published, but no name is given to it. Mr. Miller states in his description that he has seen a similar fossil from the Niagara limestone near Chicago, circular in outline, and made up of four such segments as he illustrates from St. Paul. The fossil he had in mind is doubtless one of those illustrated in the present paper.

Since the fossil to which Hall gave the name *Cryptodiscus* is without doubt a form similar to those under discussion, his name will be used in their description, although it has never been properly published.

No satisfactory explanation of the nature of *Cryptodiscus* has been given by either Hall or Miller. Hall's statement with a query, that it is the calyx of a crinoidean can hardly be correct as the quadrangular symmetry is unlike that of the corresponding part of any crinoid. Miller states that some collectors have considered the fossil to be the operculum of a coral, but he himself does not seem to regard this interpretation of it as the correct one. The genus *Goniophyllum* is the only coral possessing an operculum of four triangular plates, but *Cryptodiscus*, from the configuration of the disk, need not be compared with the operculum of *Goniophyllum.*

After a careful consideration I am led to believe that these peculiar fossils may be the remains of medusæ. Though the modern jellyfish are often of large size, they are singularly unfitted for preservation as fossils because of the entire absence of hard parts. Under favorable conditions, however, impressions of these organisms have been preserved which admit of systematic determination. Such impressions have been described from the Upper Jurassic and the Upper Cretaceous in Europe. Of a more questionable nature are the Cambrian fossils from Sweden and America which have been referred to the Medusæ by Nathorst and Walcott.

Although *Cryptodiscus* has in general the symmetry of the medusæ, the idea of its being the mere impression of such a creature is abandoned for two reasons: First, the specimens are not mere impressions in the rock, but are cavities with an upper and a lower side, from which the actual solid substance of some fossil has been dissolved. In the second place there is no reason why the mere impression in the mud of the umbrella of medusæ, should generally break into regular quadrants and be preserved as such. If we consider, however, that the specimens of *Cryptodiscus* are the casts of the gastric cavities of medusæ. both of these difficulties are eliminated. The gastric cavities of some living medusæ are divided by thin partitions into four pouches.[1] If such a gastric cavity were filled with a fine sediment, and if after the decomposition of the soft parts of the creature, this cast should become fossilized, it is easy to imagine that the four lobes of the cast might often become partially or wholly separated or destroyed during the process. The one serious objection to this theory is that probably the material originally filling the cavity of the medusa would be so nearly identical with that in which the cast was buried, that it would not be leached out, as would the shell of a brachiopod, for instance, which was of a different character from the matrix in which it was buried.

DESCRIPTION OF SPECIES.

In reading these descriptions and examining the illustrations, it should be kept in mind that they have all been drawn from the impressions in the limestone and are consequently the reverse of what the actual fossil would be. That is, what is described as a groove in these impressions would be a ridge in the actual fossil.

Cryptodiscus corrugatus n. sp. Figs. 1–2.

Disk 7 to 10$^{\mathrm{cm}}$ in diameter, finely and deeply lobed on the periphery. Funnel-shaped depression in the center 10 to 15$^{\mathrm{mm}}$ in diameter on the plane of the disk, narrowing below to the base of the central stemlike process which is from 3 to 5$^{\mathrm{mm}}$ across and rises 6 to 8$^{\mathrm{mm}}$ to the general plane of the disk. Surface of the disk ornamented with from 18 to 20 radiating corrugations on each quadrant, which extend about two-thirds of the distance from the periphery to the center. Each groove upon the corrugated surface extends to the tip of one of the narrow lobes of the periphery. Central portion of the disk within the proximal ends of the corrugations, with the exception of the central depression, plane. The whole surface of the disk, in well-preserved specimens, minutely pitted. The four ridges which divide the disk into lobes start from four angles upon the central stemlike process. These ridges upon the more weathered specimens become nearly or quite obsolete distally. The lobed periphery of the disk is rarely perfectly preserved, and in only the best-preserved specimens can the minutely pitted surface be observed.

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[1] See figure of a *Calycozoon* (*Lucernaria*), CLAUS and SEDGWICK, Text-Book of Zoölogy, Vol. I, p. 257, Fig. 197.

The specimens figured are from the collection of Mr. L. H. Hyde; beside these the species is represented in the collections of Walker Museum and of the Chicago Academy of Science. It is the commonest species of the genus which has been observed, and to it may probably be referred the specimen figured by Miller from St. Paul, Ind.

Cryptodiscus hydei n. sp. Figs. 3–4.

Disk 5 to 8^{cm} in diameter, deeply lobed between the quadrants giving the entire specimens much the form a of Maltese cross. Distal margins of the lobes in no case perfectly preserved. Funnel-shaped depression in the center 10 to 12^{mm} in diameter on the plane of the disk, narrowing to the base of the central stemlike process which is 5 to 6^{mm} in diameter, rounded over the top, and rising from 5 to 7^{mm}, a little above the general plane of the disk. Surface of the disk smooth, sometimes with shallow, ill-defined radial depressions extending from the center along the lateral margins of each lobe to the distal angles. In one specimen a shallow, ill-defined radiating depression is seen extending from near the center of the distal margin towards the proximal angle. The four ridges which divide the disk into quadrants, start from four angles upon the central stemlike process and are prominent to the bottoms of the lobes of the periphery.

The specimens figured are from the collection of Mr. L. H. Hyde.

Cryptodiscus digitatus n. sp. Figs. 6–7. 5?

Only the detached quadrants of this species have been observed. Each quadrant is deeply divided into three primary lobes, the two lateral lobes being again divided in a manner not clearly shown in the specimens. Surface covered with fine pits which are coarser towards the proximal angles. Central depression narrow and deep.

In one specimen, Fig. 5, which may belong to a distinct species, the central lobe of the quadrant is deeply bifurcate, and the lateral lobes are more deeply and more divergently divided than in the type. This specimen is also of interest in showing two quadrants somewhat separated, but still holding their relative position.

The specimens figured are from the collection of Mr. L. H. Hyde.

Cryptodiscus bilobus n. sp. Fig. 8.

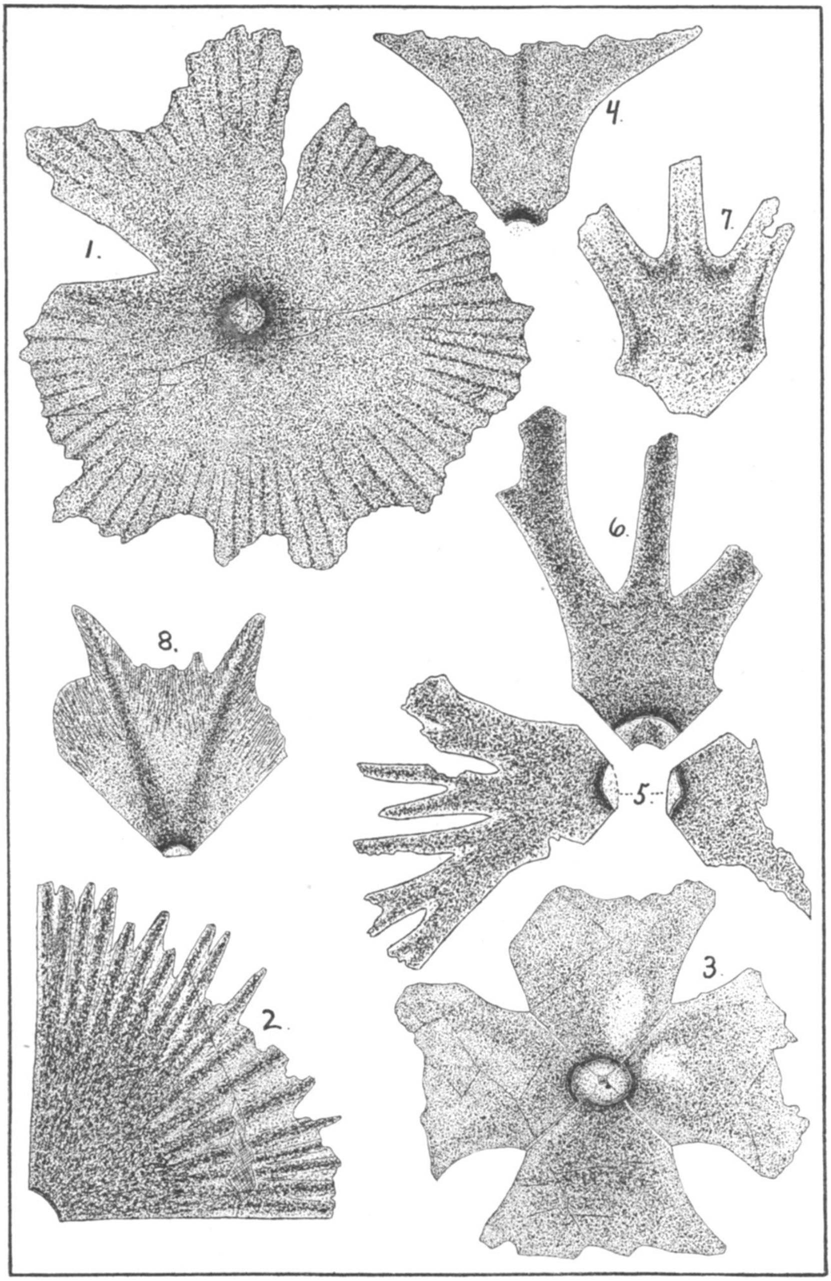
A single quadrant of this species has been observed, but that one is nearly perfect. The distal margin is divergently bilobed, with each lobe marked by a well defined, rounded, radiating furrow which extends nearly to the proximal angle, dividing the plane of the quadrant into three subequal triangular areas. Each of these areas is ornamented with fine striæ which diverge from the margins of the two radiating furrows. The central depression of the disk narrow and deep.

The type specimen is in the collection of Walker Museum.

EXPLANATION OF PLATE.

FIGS. 1–2. *Cryptodiscus corrugatus.*
  1. A complete specimen with the periphery imperfect.
  2. A single quadrant showing some of the narrow lobes of the periphery.

FIGS. 3–4. *Cryptodiscus hydri.*
  3. A complete specimen with the periphery imperfect.
  4. A single detached quadrant.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FIGS. 5–7. *Cryptodiscus digitatus.*

5. Two quadrants detached but still holding their relative position. Possibly a distinct species.
6. The lower side of the type specimen.
7. The upper side of the type specimen.

FIG. 8. *Cryptodiscus bilobus.*

The type specimen.

STUART WELLER.

WALKER MUSEUM,
University of Chicago.